Development of Residential Areas and Flood Hazards Increasingin Nurabad, Lorestan, Iran

Mohammd Rostami Fathabadi [a], Ebrahim Moghimi [b*], Mansor Jafarbaglo [c]

[a] *PhD Candidate in Geomorphology, University of Tehran (Kish International Unit), , Iran*
[b] *Professor in Geomorphology, University of Tehran, Tehran, Iran*
[c] *Associate Professor in Geomorphology, University of Tehran, Tehran, Iran*

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1. Introduction

Flooding is a natural phenomenon that human societies have accepted as an inevitable event, but the occurrence, magnitude, and the frequency of the flood are affected by many factors that vary depending on the climatic, natural and geographical conditions of each region. International UN surveys suggest that floods should regarded as one of the most serious natural disasters, and that only a few countries in the world are free from flood and flood issues. Due to the type of rainfall and geomorphological status of catchments in Iran, most of the regions and cities are exposed to floods. Some cities are more at risk because of their location. Poor growth in planning, population density, poor infrastructure, deforestation, etc. are among the factors that increase the likelihood of disaster. Badavard River basin in Lorestan province due to geomorphological and physiographic situation of the basin and having high rainfall (average more than 2 mm/year) has great potential for flooding, Accordingly, one of the cities that are subject to geomorphological hazards, including flood hazards, is Nurabad city in the Nurabad county which has undergone significant physical development in recent years. There are many settlements, especially in the southern areas of the city, and due to the morphology of the area it is anticipated that in recent years the development trend will be towards the southern areas as well as the river margins of the city.

2. Study Area

Nurabad city is surrounded by Selseleh, Doreh and Kuhdasht cities in Lorestan province, Shirvan and Chardavol in Ilam province, Kermanshah, Harsin, Sahneh and Kangavar in Kermanshah province and Nahavand in Hamadan province. Nurabad city is located between an altitude of about 1000 meters to 3500 meters above sea level and in terms of geomorphology, the main landscape of the area is a mountain unit. In terms of climate, the city has cold and snowy winters and almost mild summers.

*. Corresponding author: Ebrahim Moghimi. E-mail: emoghimi@ut.ac.ir Tel:09124392790

3. Materials and Methods

In this study, descriptive-analytical method and software were used to identify flood-prone areas and to evaluate the development of residential areas. The data used include the DEM 30 m, various layers of information provided by the organizations and satellite imagery of the study area. The tools used include ARCGIS, ENVI and IDRISI software. The method used in this study had two stages. In the first stage, WLC and AHP models were used to identify flood-prone areas, as well as the four criteria of river distance, lithology, land use type, elevation, slope and slope direction which has been selected based on the opinion of experts and according to the characteristics of the region. Secondly, in order to evaluate land use change trends and the development of residential areas towards flood zones in the study basin, land use maps were prepared from 1990 to 2019. In the third stage, LCM (Land Change Modeler) model was used to review and analyze the changes and to evaluate the process of land use change and development of residential areas towards flood-prone areas.

4. Discussion and Results

In this study, WLC and AHP models were used to identify flood prone areas. The results indicate that many sections of the study area are within the range and risk of flooding. In fact, according to the parameters considered, the final map of flood-prone areas has been prepared and the final map was divided into 5 classes. According to the map, the class of very high is mainly comprised of adjacent river areas, low slope and low altitude areas. This class, with an area of 76.1 km^2, covers about 12.3 percent of the basin. The high-potential class also consists mainly of the middle parts of the basin and the areas adjacent to the rivers, and has low elevation and slope. This class, with an area of 145.8 km^2, comprises 23.5 percent of the basin. The mean class covers a large part of the basin, so that with an area of 251.8 km^2comprises 40.7 percent of the basin, which mainly consists of low height, gentle-slope areas that are away from the river. The class of low potential has an area of 108.7 km^2, comprising 1.5 percent of the basin. The class mainly consists of foothills and the areas far from rivers. In addition, the high-potential class, with a surface area of 37 km^2, covers about 5.97 percent of the catchment area, including areas with high elevation and slope as well as offshore areas.

5. Conclusion

The results of the present study indicate that the city of Nurabad has a high potential for flooding. Given that residential areas such as Nurabad are located in high flood potential classes, attention to these areas and preventive measures is essential. In this regard, the evaluation of land use changes in the study area indicates that in accordance with the increasing trend of population, residential land use has also undergone significant changes. The results of the evaluation of the process of development of residential areas indicate that the land use area was about 2.94 km^2 in 1990 year. This has increased to 3.68 km^2 in year 2000, to 5.34 km^2 in year 2010 and to 6.36 km^2 in year 2019. Evaluation of the calculations shows that among the land uses of the study area that have become residential land use, there is a 0/23 km^2 orchard, a 3.9 km^2 agricultural land use and also a 1.1 km^2 pastures and lands are barren lands. In light of the above, in

recent years, the trend of residential areas in the city of Nuabad has been moving towards flood-prone areas.

Keywords: Flood, Hazards, Land Use Changes, Nurabad

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